

# **TOWN OF IGNACIO CAPITAL IMPROVEMENTS PLAN**



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# Ignacio Capital Improvements Plan

## Contents

Section 1 – Background and Introduction .....	1
Previous and Current Asset Management Tools .....	1
Intent of This Report .....	3
Section 2 – Water Infrastructure .....	4
Existing Infrastructure Summary .....	4
Known Deficiencies .....	4
Water Model .....	4
Recommended Improvements .....	5
Section 3 – Sanitary Sewer Infrastructure .....	7
Existing Infrastructure Summary .....	7
Current Rate Structure .....	7
Known Deficiencies .....	7
Recommended Improvements .....	7
Section 4 – Irrigation Infrastructure .....	9
Existing Infrastructure Summary .....	9
Known Deficiencies .....	9
Recommended Improvements .....	9
Section 5 – Natural Gas Distribution Infrastructure .....	9
Existing Infrastructure Summary .....	10
Recent Updates / Outstanding Deficiencies .....	10
Recommended Improvements .....	10
Section 6 – Transportation and Drainage Infrastructure .....	11
Infrastructure Summary .....	11
Recommended Improvements .....	11
Section 7 – Asphalt Management Plan .....	23
Introduction .....	23
Pavement Maintenance Procedures .....	23
Pavement Rehabilitation Procedures .....	24
Pavement Maintenance Priorities .....	25
Pavement Maintenance Plans and Costs .....	25
Conclusions .....	30
Attachments and Appendices .....	31
(Water Model and Other Data, Maps, references) .....	31

## Section 1 – Background and Introduction

### Intent of This Report

This report is intended to serve as a guidance document for the Town in directing future capital spending and resolving current issues identified by Town staff for improvements to Town infrastructure. The report expands on the broader suggestions in previous reports. These improvements are broken down into executable, discrete projects. These projects can then be prioritized by urgency, overall benefit, and budget considerations. This report is not intended to review in-depth or duplicate previous master planning / multi-agency coordination efforts.

### Previous and Current Asset Management Tools

The Town of Ignacio has generated several asset management tools in the recent past that will continue to guide capital improvement decisions. In 2009, the Town published a Community Master Plan that described the current status and recommended improvements to the Town's Potable Water, Sewer, Irrigation, and Storm systems. A separate Natural Gas Planning Study and Transportation Master Plan were also published in 2009. The Transportation Master Plan was supplemented in 2011 by the Ignacio Area Corridor Access Plan. More recent additions to the Town's range of asset management tools are a GIS-based interactive map of Town utilities and this Capital Improvements Plan.

#### Previous Tools:

In 2009, Souder Miller and Associates (SMA) drafted a *Community Master Plan for the Town of Ignacio* (CMP), relating to Town Utility Infrastructure. The Master Plan analyzed current and future needs within the Town's water, sewer, irrigation, and storm sewer systems; and then offered recommendations for improvements based on current (2009) deficiencies or future demands. The Master Plan did not prioritize or establish construction estimates for budgeting of said improvements, and many recommendations are still to be implemented.

The Town's natural gas distribution system was analyzed separately in 2009 by Bradley B Bean, PE. The findings and recommendations were submitted to the Town in the form of a *Town of Ignacio 2009 Planning Study; Natural Gas System*. The study found several areas of concern for outdated pipe and low capacity for service, and made recommendations on system improvements to alleviate both concerns. No cost estimating or prioritization was performed, but future growth of the Town was accounted for in the Planning Study.

SMA also drafted a *Transportation Master Plan* (TMP) for the Town in 2009. The goal of the master plan was to outline and establish the community's vision for transportation moving forward. The primary approach was to determine the impacts and needs for the expanding mesa area while also evaluating the condition and capacity of the existing transportation network. The primary findings were that Goddard Ave (SH 172) traffic would exceed the capacity of a 2-lane facility by 2030 and more connectivity would be needed to accommodate growth in the mesa area. Additionally, expansion of Goddard Ave would not be feasible given the limited right-of-way through town and the desire to make the down-town area more pedestrian friendly. To that end, SMA proposed performing at least one of the following improvements:



1. Constructing a “regional bypass” route to relieve congestion through town. SMA notes this may be problematic due to the Los Pinos River and tribal lands around Ignacio.
2. Constructing a by-pass between Ute Street (SH 151) and Goddard Ave (SH 172) through Northeast Ignacio to relieve the heaviest movements at the intersection of the two roads. This has the same constraints noted in number 1.
3. Provide greater connectivity within Ignacio to alleviate local demand on SH 172. This could include connectivity along Rock Creek to CR 320B, a new North-South connector to the West of CR 320, and extension of Candelaria, Arboles, and other East-West roads to the North-South connector.

The *Transportation Master Plan* also recommends improvements to bring the current roadway system into compliance with modern standards. This includes adding curb, gutter, and sidewalk to many roadways, adding bicycle friendly facilities, replacing old guardrail with current industry standards, and constructing new roads with 12-ft lanes, bike lanes, curb and gutter and sidewalk.

The 2011 Ignacio Area Corridor Access Plan (IACAP) is a multi-agency guiding document created with input from the Colorado Department of Transportation (CDOT), the Town of Ignacio, La Plata County, and the Southern Ute Indian Tribe (SUIT). The intent of the document is to provide a standard design regime for the multi-agency corridor in order to streamline both design and stakeholder buy-in for individual projects. This was spurred by the SUIT adopting an aggressive redevelopment plan for facilities adjacent to SH 172, SH 151, and CR 517 as well as identification of several sites for future commercial development. The IACAP also seeks to address the high potential for growth in the greater Ignacio area, present and future congestion, and the safety of pedestrians, cyclists, and drivers.

The IACAP presents a range of alternatives that address these concerns and recommend a preferred alternative based on extensive agency and public input. The report’s recommendations are summarized in the table below.



**Table A: IACAP Recommendations**

Key Components of the Recommended Alternative
SH 172 north – with raised medians and sidewalks/curb/gutter connecting the town to the casino. The median will terminate near the Catholic Church where it transitions to a painted median, then to the downtown two-lane cross section.
Crosswalks will be provided at all major intersections.
CR 517 access improvements with sidewalks/curb/gutter extends from SH 172 to Ute Road. Several driveway access points to tribe administrative areas will be reconfigured to conform to the Tribe's Comprehensive Land Use Plan.
Provisions for sidewalks, lighting, signage, and landscaping will be integrated throughout the corridor.
New or improved intersections will be added as needed. Traffic signals will be installed at CR 517, CR 314, Ute Rd, Becker St, and CR 318 as development and associated traffic growth requires.
Intersection improvements will be made at two locations for the proposed West Mesa development. North access will be across from Ute Rd.; south access will be at Cedar Street.
The only intersection requiring a signal under current conditions is at SH 172/151. Traffic models show that the signal can be installed without turn lanes, using the existing lane configuration. This allows all on-street parking to remain in place for the foreseeable future. The signal can be timed during non-peak hours to only call for a red light when traffic stops waiting for a left turn on SH 151. During peak hours, the signal will be timed in a normal sequence.
A future phase for the downtown intersection will be identified with left turn lanes that would require the removal of several on-street parking spaces. Additional or replacement parking would be required at that time.
The downtown redevelopment plan will be incorporated to the extent possible for the seven blocks between Lakin and Pine Streets. The cross section includes several features such as 10 ft. sidewalks, on-street parallel parking, one travel lane in each direction, pedestrian friendly "bump-outs" at certain intersections, integrated landscaping, and crosswalks. Ute St., across from SH 151, will become a one-way segment for part of the block to allow diagonal parking on both sides.
Traffic calming devices such as speed tables (a friendlier and more effective form of speed bump) will be placed on Shoshone Ave. The street will also be restricted from through traffic and trucks.
Full movement/four-way intersection at Cedar St.
Raised median and sidewalks from approximately south town limits to CR 318. Access to the commercial property at CR 318 is provided at two locations.
Improvements at the intersection of Buck Hwy and La Boca Rd with SH 151 will include turn lanes and roadway realignment with a conventional configuration.

#### **Current Tools:**

The Town has recently (spring 2017) created a Geographical Information Systems (GIS)–based utility infrastructure inventory. As of June 2017, the Town's utility GIS system is up and running, and Town Staff is continuing to add data into the system as they discover discrepancies or absences of information during the course of their work. The GIS utility mapping system is an internet-based, interactive, updateable asset management tool. The current system includes the Town's water, sanitary sewer, irrigation, and natural gas distribution systems. Storm sewers have not been included in the GIS system.

The Town is also working on a comprehensive rate study for water, sewer, gas and irrigation utilities, and this information will be incorporated into established rate structures for each utility. This analysis will create base rates for these utilities, which will also include an estimated portion of replacement costs factored in. The percentage of total replacement cost allocated within the base rate is still yet to be determined.



## Section 2 – Water Infrastructure

### Existing Infrastructure Summary

The Town's current water distribution system is supplied by 3 master meters tapping potable water mains owned by the Southern Ute Indian Tribe (SUIT). The Town's distribution network is comprised largely of C-900 PVC water mains, however several Asbestos Concrete (AC) water lines remain in use. The distribution network is shown in Exhibit A.

In the *Community Master Plan*, the existing water infrastructure was modeled using EPANET, a software developed by the Environmental Protection Agency's Water Supply and Water Resources Division. In EPANET a virtual network can be built that accurately represents the piping system of a municipality. Demands were determined by performing a manual count of business and residential connections within the Town limits. Businesses and residences were assigned estimated usages in the network, and International Fire Code (IFC) was used to establish peak water demands for fire safety within the Town.

The Master Plan showed that the Town would likely not meet required fire flow demands within the downtown grid, and recommended adding a master meter connection to the SUIT supply line to achieve higher flow capacity. The Master Plan further recommended replacing all AC water mains with C-900 PVC pipes.

### Known Deficiencies

Fire hydrant flow tests from January of 2014 showed that the Town was unable to meet IFC required water flows. Inadequate fire flows were measured at critical areas on Romero Ave, near Ignacio Elementary, and in the downtown area, near the intersection of SH 151 and SH 172. It should be noted that these flows were recorded prior to the installation of the additional master meter. An additional master meter connection to the SUIT supply was installed in 2015.

The Town has been able to replace several sections of AC water mains, but there are still thousands of feet of AC line in operation. These lines should stay a top priority for replacement within the Town's water infrastructure considerations, especially prior to any street improvements or paving projects.

### Water Model

As noted above, the 2009 EPANET model neglected to consider several changes to the Town's water system that have been made since 2009. RPE used the 2009 model as a base and made changes to reflect improvements that have been made to the water system since 2009, including the removal of AC lines and replacement with larger PVC piping and the addition of a master meter near the Ignacio Middle School and additional looping near the High School and Middle School.

RPE also updated the system demands based on recent water usage data provided by the Town. As part of this study, fire hydrant tests were conducted by the Pine River Fire District. The tests results are demonstrated on Exhibit A.

These tests indicate that adequate fire flows exist in each tested location except for the Burns/Dixie location. The low flow here is due to the dead-end 4" diameter pipe located along CR320A. This waterline is not currently planned for replacement, but the Town may want to consider this with any future improvements to CR320A. It is not known if the PRV near the Middle School allowed this water main connection to activate during the fireflow. Due to the short duration of the test, it is likely this

valve did not activate. Therefore, it is likely that actual fire flows are higher than the testing indicates when the larger valve opens up.

When analyzed for IFC required fire flows, the EPANET model as updated by RPE to reflect current Town infrastructure showed adequate capacity. The EPANET model generally shows fire flow capacity well above the tested available fire flow. This may be partially explained if the PRV near the middle school did not fully activate during the fire flow test.

The additional fire flow in the model is also likely due to the model using three connection points to the SUIT water main. Each of these connections is represented as an unlimited flow of water at a sustained pressure. In reality, these connections will decrease in pressure as water in the SUIT flows to the demand. Modeling the SUIT water system is out of the scope of the current study.

The updated model did not indicate any static pressure issues. The Town has not reported any issues with domestic pressures.

### Recommended Improvements

A map of proposed high priority improvements is shown in **Exhibit A**. Proposed water system projects are listed below with conceptual level cost estimates.

**Table B: Summary of Water System Project Costs**

Near Term (0-5 years) Water System Projects	Cost
W1: Becker Street PRV and Water Line Improvements	\$326,500
W2: El Paso Road AC Water Line Replacement	\$ 76,500
W3: Browning Ave Water Line Improvements	\$226,000
W4: Aspaas Ave AC Water Line Replacement	\$162,300
W5: CR320A Water Line Replacement	\$133,900
<b>Total</b>	<b>\$925,200</b>

#### Project W1: Becker Street PRV and Water Line Improvements

The first set of improvements involves consolidating the existing water mains at Becker Street and relocating the existing pressure regulating valve (PRV) to a new location between Romero and Becker, possibly on Town land at the bottom of the hill on Becker Street. The existing 6-in AC water lines on Romero Street and Becker Hill will be abandoned in place and replaced with 8-in C-900 PVC. A loop connection will be constructed for Romero Street water main improving reliability and fire flow. These improvements will accomplish the following to improve the overall Town water system;

1. Relocate the PRV to Town-controlled land
2. Construct loop for Romero Ave water main for improved reliability and fire flow
3. Replace old 6" AC pipe with 8" PVC pipe for added reliability, fire flow and reduced maintenance



#### Project W2: El Paso Road AC Waterline Replacement

The second set of improvements provides a connection between El Paso Road and Center Alley and replaces an existing 6-in AC water line. Currently the PRV located at the top of El Paso Road only feeds the hydrant near El Paso Road and Browning below the mesa. This connection will improve fire flow to the south end of Town.

#### Project W3: Browning Ave Waterline Improvements

The third set of improvements will reconnect services on Browning Ave From Pine Street to Empire Street to a new 8-inch C-900 PVC water main that replaces an existing 4-inch AC water line. The 4-inch line limits flow and creates maintenance issues.

#### Project W4: Aspaas Ave AC Waterline Replacement

The final set of improvements in the high priority plan laid out by RPE is replacement of the existing 6-inch AC water line on Aspaas Avenue with 8-inch diameter C-900 PVC.

#### Project W5: CR320A Water Line Replacement

The hydrant testing revealed that the hydrant located at the end of 320A has substandard hydrant flow for residential properties. This lack of fire flow is due to the hydrants location on a long dead-end of 4-inch pipe. RPE recommends the replacement of this water main with a 8-inch diameter C-900 PVC to provide a minimum of 1000-gallons per minute (gpm) fire flow at this hydrant.

## Section 3 – Sanitary Sewer Infrastructure

### Existing Infrastructure Summary

Sewage from the Town of Ignacio is currently routed to a wastewater treatment plant operated by the Southern Ute Indian Tribe, which has a capacity of 800,000 GPD and also serves the Southern Ute Reservation and areas of La Plata County around Ignacio. In 2009, the Town contributed approximately 81,000 GPD, which is only 10% of the overall capacity of the plant. The Town has 5 connections to the SUIT sewer main, and only one is metered, therefore actual flow data is unavailable. Based on recent water meter readings, sewer flows can be estimated at 72,000 GPD using the 30-day average. While 100% of the domestic water does not flow into the sewage system, there is likely some infiltration into the system in the lower portion of Town. Therefore, this number is our best estimate of current sewage flows.

The majority of sewer lines within the town are PVC, however some vitrified clay pipe (VCP) does remain.

### Current Rate Structure

Currently, the Town residents pay a fee of \$73 per equivalent residential tap. Based the 2016 Colorado Municipal Water and Wastewater Rate Survey Results, the average residential fee for sewer is \$38/month. The fees paid by the Town are considerably higher than the average, and the Town is currently pursuing a joint rate study with the SUIT.

The Town does not pay based on sewer usage, but on equivalent residential taps. There is a meter on one of the return lines to measure flow, but this is not used to calculate fees. It should also be noted that several sewer taps from SUIT properties adjacent to Town limits connect to the Town sewer system. This occurs at both the northwest and eastern edges of Town. Therefore, it would be difficult to measure Town usage independent from these taps.

### Known Deficiencies

The VCP that is still in use is an outdated material that allows infiltration of groundwater. Additionally, the analysis performed by SMA indicates low velocities, which could contribute to solid settling and the potential for clogging. However, this issue has not been brought to the attention of RPE by the Town. Any VCP should be replaced prior to street reconstruction or paving projects.

Existing manholes are not sealed and are likely allowing infiltration into the system in the low parts of Town where high groundwater is prevalent. While infiltration currently does not add to the sewer costs paid by the Town, it does create an unnecessary burden for the SUIT wastewater treatment plant.

### Recommended Improvements

A map of proposed high priority sewer collections improvements is shown in **Exhibit B**.

The proposed improvements include replacing 750 linear feet of VCP with 8-inch PVC sewer main and reconstructing 6 inverts in 4 existing manholes. Also proposed is the addition of four manholes at existing dead end runs of sewer pipe, as shown on the improvements map.

In addition, the manholes in the lower portion of Town should be sealed to prevent groundwater infiltration.

The estimated cost of these improvements is **\$230,000.**



## Section 4 – Irrigation Infrastructure

### Existing Infrastructure Summary

The town of Ignacio operates an Irrigation Utility, which provides raw water to approximately 250 customers who use the water for landscaping and yard watering. The system was built in 1993, and has approximately 6.9 miles (2.79 miles inlet piping and 4.11 miles distribution piping) of underground pipe (transite and pip) and a number of isolation and control valves. Service flows are all gravitational, however customers located on the mesa use pumps to increase water pressure. Operation is from May-September and services are not metered. This system significantly reduces the amount of treated water that would otherwise be used by water customers for landscaping and yard watering.

Irrigation water is provided by two sources each with specific water rights. Water is diverted, transported, and stored in an approximately 0.4 acre-foot storage pond located on Town property. The sources are:

- BIA water (shares totaling 17.36) conveyed in the Goodnight Ditch flows into the pond located at the northwest corner of the Town limits.
- Los Pinos River water is collected in an infiltration gallery north of Ignacio and conveyed through an 8" pipeline, which is also directly connected to the raw water distribution pipeline within the Town limits.

### Known Deficiencies

The current system is in operation, however there is a need for some maintenance and repairs, and additional information on system capabilities and capacity. Some of the challenges are:

- System flows are gravitational and users located in proximity to the storage pond only experience about 5-10 psi line pressure due to the low-head pressure. These users utilize small pumps to increase water flow rates. Pump maintenance and pump failures are issues and complaints the Town addresses on a regular basis.
- The storage pond is a dirt pond with no liner and is currently experiencing some leakage caused by poor inlet piping and prairie dog burrowing.
- Limited isolation and control valving is problematic when system maintenance and operations require localized control. The lack of system looping also adds to this problem.
- No water modeling has been completed on the system and there are a number of unknowns such as the system impacts from pressurize or looping, or what the overall system capacity is based on current storage and usage.

### Recommended Improvements

The proposed Improvements consist of adding valves to the existing system at key locations. A proposed valve configuration is shown in **Exhibit C**.

These valves will allow the ability to better isolate problem areas for repairs and maintenance. The estimated cost of these improvements is **\$26,700**.

## Section 5 – Natural Gas Distribution Infrastructure

### Existing Infrastructure Summary

A map of the Town's current natural gas distribution infrastructure is shown on **Exhibit D**. The current infrastructure includes many of the recommendations made in the Town's 2009 Planning Study. The natural gas distribution piping is a combination of dated steel piping and newer medium density polyethylene (MDPE) pipe.

### Recent Updates / Outstanding Deficiencies

The Town is slated to complete the final phase of a Department of Local Affairs (DOLA)-funded gas line replacement project in 2017. The projects have systematically replaced outdated or undersized mains within the Town. Additionally, the Town has installed AMI meters on new service connections with the recent gas replacement projects, and will replace over 90% of Town meters by 2018.

Based on discussion with the Town and Bradley B Bean, the Town's gas consultant; the town's infrastructure has been largely brought up to date. There are a few specific areas of concern for pipe replacement, but the Town has installed cathodic protection (CP) and will monitor readings for those pipe segments. It has been recommended by Bradley B Bean that the Town initiate a steel pipe replacement fund for their gas distribution system. As most of the replacements are estimated to be 10 or more years out, and considering the flexibility required with such project scoping, it is outside the scope of this report to offer recommendations or cost estimating for such a replacement fund. Finally, initiating the fund would be a strictly budgetary consideration for the Town.

There are recommendations for additional looping and routing of new gas distribution mains, but they are triggered by additional demand generated by Town growth. These items should be addressed as applications for building permits, Town development approvals, or annexation requests are received.

### Recommended Improvements

A map of proposed high priority improvements is shown in **Exhibit D**.

**Table C: Summary of Natural Gas System Project Costs**

Near Term (0-5 years) Natural Gas System Projects		Cost
G1: Center Alley, Pioneer St. to Ute St. Steel Line Replacement		\$64,100
<b>Total</b>		<b>\$64,100</b>

#### G1: Center Alley, Pioneer to Ute St. Steel Line Replacement

One steel line that has been left in service is in Center Alley from Pioneer to Ute Street. This line has been left in place to date because the alley surface is concrete, and replacement has been cost prohibitive as a preventative maintenance project. This section of pipe has been singled out from the remaining steel lines within the Town because it is expected to be among the first requiring replacement based on CP readings.



## Section 6 – Transportation and Drainage Infrastructure

### Infrastructure Summary

The Town of Ignacio's Transportation Master Plan (TMP), as well as the Ignacio Area Corridor Access Plan (IACAP), lays out the overall goal of increasing and improving connectivity throughout the Town and to reduce congestion along SH 172. Furthermore, both plans call for new construction to meet standards that will increase pedestrian safety and promote alternative transportation methods, such as bicycles and transit. Most of the existing roadways in town are two-lane with no facilities for bicycles and limited pedestrian protection. The Town of Ignacio is required to adhere to the Proposed Guidelines for Pedestrian Facilities in the Public Right-of-Way (PROWAG) and Americans with Disabilities Act (ADA) standards for accessibility on public streets and sidewalks. These standards establish requirements for pedestrian access and parking areas. Most existing pedestrian facilities do not meet these standards. Additionally, roads are often restricted in size by limited right-of-way width and existing structures, making road expansion projects impossible or infeasible.

Neither the IACAP or the TMP address the need for an asphalt maintenance plan. These plans are also broad, overarching plans, that require further design development to address specific issues related to each project. The Capital Improvements Plan evaluates the known problem areas of the Town's transportation system and provides solutions and costs to guide future capital projects.

### Recommended Improvements

Nine projects have been identified as significant to reaching the goals of the TMP and IACAP, as well as the Town's known issues, and are summarized below. Additionally, **Exhibit R0** includes an overall area map identifying the location of each project. Conceptual level cost estimates were prepared for each option. At this conceptual level of design, there are numerous unknowns, therefore, these estimates should be used for general budget planning purposes only. Table D below summarizes the projects and estimated costs:

**Table D: Summary of Street/Drainage Projects**

Near Term (0-5 years) Transportation System Projects	Cost
R1: Goddard Ave (SH172) & Becker St. Pedestrian Safety Improvements	Alt 1A -Curb Bump Out: \$46,200 Alt 1B -Pedestrian Push Signal \$ 87,400 Alt 1C Traffic Signal \$ 442,900
R2: Browning Ave. & El Paso Street Rd. Improvements	Alt 2A (minimal SD and sidewalk) \$142,370 Alt 2B (full SD and sidewalk) \$264,430
R3: HWY 172 & Browning Ave. Pedestrian Improvements	\$103,000



R4: Shoshone Ave Street Improvements Near Ballpark	\$57,800
R5: Goddard Ave.(SH172) & Pioneer St. Parking Improvements	\$58,400
R6: Lampert St. & Goddard Ave. (SH172) Improvements	\$31,000
<b>Total</b>	<b>\$438,770 (assuming lower cost options where options provided)</b> <b>\$957,530 (assuming higher cost options)</b>
<b>Mid-Long Term (5-15 years) Transportation System Projects</b>	<b>Cost</b>
R7: Becker Hill Improvements	\$383,900
R8: Improve CR320 B and Connect to SH 172	Alt – 8A (bridge across Rock Creek) \$4,333,700 Alt- 8B (no bridge option) \$3,476,800
R9: Goddard (SH172) Corridor ADA Compliance	\$333,200
R10: Reconstruct and Improve El Paso Rd	\$613,100
<b>Total</b>	<b>\$5,413,900 (with Alt 8A)</b> <b>\$4,806,900 (with Alt 8B)</b>

#### **Project R1: Goddard Ave.(SH172) & Becker St. Pedestrian Safety Improvements**

##### *Existing Conditions:*

There is currently a need to improve pedestrian safety for individuals crossing Goddard Ave (SH 172) at Becker St, as shown in **Exhibit R1**. The speed limit on both Becker and Goddard at this intersection is 25 MPH and the southbound approach along Goddard is striped for left turn, thru, and right turn lanes. The curb-to-curb distance is roughly 50 feet. A curb inlet on the northwest side of the intersection prevents an ADA compliant ramp at that corner. While there is a north-south crosswalk on the east side of the intersection, there is no east-west crosswalk across Goddard. No sidewalks exist on the approach to the intersection from the east, and although curb ramps are present on each corner, they are not ADA compliant. Additionally, an existing structure on the southeast corner is built with zero setback from the sidewalk, making expansion in that direction impossible. This encroachment limits sight distance for vehicles turning onto Goddard. Existing trees also limit sight distance from Becker Street.

##### *IACAP/TMP Recommendations:*

The IACAP proposes installation of sidewalk bump outs on the south side of the intersection and full signalization. Additionally, although the IACAP doesn't show a left turn lane on the northbound side of Goddard, one can be assumed based on the configuration described. The TMP is less specific and merely recommends general improvements in the east-west connectivity for pedestrians and improving sidewalk connections to schools as part of the "Safe Routes to Schools" programs.

### *Assumptions:*

To preserve the intersection performance, the southbound right turn lane from Goddard to Becker will need to be maintained. Right turn deceleration lanes are not typical for urban streets because they increase vehicle speeds and conflicts with pedestrians, however it is assumed this lane is used by school buses. Town may want to consider removing this lane at some point in the future. The northbound left turn lane will also need to be maintained to prevent backups on Goddard while turning vehicles wait for a gap in oncoming traffic. The ideal project would accomplish the goal of improving pedestrian safety while keeping the crossing at this intersection, without relocation of the curb inlet, and without any ROW acquisition. Based on existing sidewalk condition, the south side of the intersection provides the preferred route to avoid these constraints.

### *Alternative Solutions:*

#### *Alternate R1A*

The first, and least expensive, solution is to install curb bump outs on the south side of the intersection to shorten the pedestrian crossing distance. A full-size bump out is possible on the west side of Goddard due to the existing on-street parking on this side. A reduced bump out is possible on the east side, which is necessary to construct an ADA-compliant ramp due to the existing building constraint in this location. Crosswalk striping and signing would also be added. This alternative should encourage drivers to reduce their speed as they're entering the downtown area and will increase visibility of pedestrians crossing Goddard. This alternate should be considered Phase 1 of future improvements and designed to accommodate future signal foundations. Pedestrian crossings construction within the CDOT ROW requires interagency coordination and the bump outs themselves may necessitate installation of storm drain infrastructure or chase drains to maintain curb flow. Trimming or removal of existing trees may be required to improve sight lines and make room for infrastructure. **The approximate cost of this project is \$46,200.**

#### *Alternate R1B*

The moderate cost option would be to add a push-button Rapid Flash Beacon (RFB) to the Alternate 1A improvements. These beacons increase motorist awareness and compliance and add safety for pedestrians. Adding the RFB assembly adds cost and increases impacts on the roadway. Furthermore, driver compliance may still be imperfect, particularly if traffic backups result from high crossing rates. This could be mitigated by allowing for pedestrian queuing with an appropriate wait from the time the button is pushed to the time the flashing beacon is activated. Finally, this option requires modification of the IACAP and considerable coordination with CDOT. **The approximate total cost of this project is \$87,400 and the additional cost from Alternate 1A is \$41,200.**

#### *Alternate R1C*

The highest cost alternative is a traffic signal with curb bump outs as recommended in the IACAP. Signalization provides the best vehicle compliance and is the safest for pedestrians. An updated traffic study of this area would be needed to determine if traffic warrants are met for a signal. **Installing signals is the most expensive option at approximately \$442,900**



## **Project R2: Browning Ave. & El Paso Rd. Improvements**

### *Existing Conditions:*

The area shown in **Exhibit R2** requires several improvements to meet current design standards. An existing underdrain storm pipe collects groundwater from irrigation on the mesa uphill of Browning. This underdrain is routed into a cattle-guard trench drain crossing Browning Ave. This cattle guard is not only sub-standard for traffic, it is also non-ADA compliant and looks to be beyond its normal useful life span. Additionally, the metal bridge across the ditch is non-ADA compliant due to a steep cross slope, and also appears to be in need of replacement. Finally, no sidewalks exist between Browning and Goddard, forcing pedestrians to walk on the street or on unpaved areas. The irrigation ditch flowing along El Paso is approximately 1 foot below the road grade and slopes at roughly 1% before flowing into a 24-inch storm drain under Goddard. These parameters constrain the addition of a storm drain system to replace the cattle guard/trench drain system currently in place. An 18-inch reinforced concrete pipe (RCP) daylights into the ditch about halfway between Browning and Goddard at an alley. This pipe has very little cover and drains a considerable area in the south part of Ignacio. The south side of El Paso is currently undeveloped.

### *Master Plan Recommendations:*

The Community Master Plan proposes installing an 18-inch storm drain from the cattle guard to Goddard, though it does not address replacing the cattle guard. This storm drain would connect to manhole at the end of the alley between Browning and Goddard. Additionally, the alley storm drain would be replaced with a large diameter storm drain and inlets would be installed on the South Side of El Paso. Finally, the existing storm drain from Goddard and El Paso to its outfall at Rock Creek would be replaced with one 60-inch pipe or two 48-inch pipes. The TMP calls for 4-6 foot paved sidewalks and curb and gutter for all local streets.

### *Assumptions:*

The Town would prefer to rely on future development of the lot on the South side of El Paso to provide development of the sidewalk connecting Browning to Goddard. Additionally, the storm drain system improvements should be limited as much as is practical to reduce costs.

### *Alternative Solutions:*

#### **Alternate R2A**

The lowest cost solution is to replace the cattle guard/trench drain system with an 18-inch elliptical RCP pipe and curb inlets, as shown in **Exhibit R2**. The asphalt around the cattle guard would be removed and replaced, and the cattle guard and metal bridge would be removed to be replaced with extensions of the curb and gutter, with an ADA ramp to the intersection. The 18-inch elliptical RCP would be extended approximately 110 feet to the east to daylight into the existing ditch. This option is lower cost and lower impact but relies on development of the South side of El Paso to provide pedestrian connectivity to Goddard, which is uncertain at this time. **The approximate cost of this project is \$142,370.**



### Alternate R2B

The higher cost alternative makes the same improvements at the cattle guard but extends the 18-inch elliptical RCP running all the way to Goddard. A manhole would be installed to connect the alley storm drain and the ditch on the North side of El Paso would be filled so that a 5-foot sidewalk with curb and gutter could be installed. Additionally, a curb inlet at the corner of El Paso and Goddard would be installed to drain that area. While this option is higher cost and impacts residents more, it is not tied to the uncertain development of the South side of El Paso and would reduce the maintenance that is needed on the existing ditch. **The approximate cost of this project is \$264,430.**

### **Project R3: Hwy 172 & Browning Ave. Pedestrian Improvements**

#### *Existing Conditions:*

The existing street and access layout of the intersection of SH 172 and Browning Avenue at the Patio Restaurant is undesirable for several reasons. As shown in **Exhibit R3**, the diagonal layout allows for high speed traffic to exit SH172 onto a residential street. Additionally, the multiple access points (west alley, residential driveway, North and South Browning) create confusion and points of conflict. Furthermore, the Patio Restaurant has three access points on SH 172 and undefined access for its entire frontage on Browning. This creates more potential conflict points for vehicles and pedestrians, particularly when paired with the lack of a sidewalk on the West side of SH 172 until South of Becker Street. The triangular landscape strip between SH 172 and Browning is underutilized and could be used for new Town signage and improved landscaping. North Browning is signed as one-way southbound to prevent dangerous northbound left turns onto SH 172.

#### *IACAP Recommendations:*

The IACAP recommends the following improvements to bring this area up to standard:

1. Close the western alley, residential driveway, and Browning North access to SH 172. Consolidate access at Browning South.
2. Reduce patio restaurant to two access points on SH 172.
3. Install sidewalk along SH 172 frontage.
4. Install raised median in SH 172 North of Browning intersection.

The IACAP recognizes that the LOS for the intersection was at Level C for eastbound left and right turns at the time of the study but these movements will be reduced to Level F for future traffic volumes (2031).

#### *Assumptions:*

The town does not wish to restrict access as severely as is recommended by the IACAP, however safety for pedestrians and vehicles is still important. The Town discussed making Browning one-way only to Ignacio Street, however we do not recommend this solution for the following reasons: First, this will not discourage speeding down this portion of Browning Street. Second, it would limit access to multiple residential properties and the Patio restaurant and encourage illegal traffic flow for people looking for a short cut on a wide and mostly empty street.

#### *Alternative Solutions:*

The preferred solution is to follow the IACAP recommendation and restrict access along SH 172 to close the north Browning access and access along the Patio Restaurant frontage. To allow truck movements into the restaurant parking area, the curb radius at Browning South would be increased, which would permit truck access to the Patio Restaurant, but require a reduction in vehicle speed to make the turn. It would also allow for two-way access to residential properties on Browning and maintain full access at SH 172. This project would likely be endorsed by CDOT, since it generally follows the approved IACAP. It would require coordination with the property owner and CDOT, **and cost approximately \$103,000.**

#### **Project R4: Shoshone Ave. Street Improvements Near Ballpark**

##### *Existing Conditions:*

As shown in **Exhibit R4**, the existing water service trench that serves the park restrooms has settled and resulted in a failure in the asphalt surface. Additionally, the water meter for the bathroom is located in the sidewalk, with a large cap in the sidewalk concrete around the meter. The pavement in this area is cracked and failing in various places and there is no sidewalk connection or crosswalk between the library and the park, causing pedestrians to use the gravel shoulder next to the curb.

##### *IACAP/TMP Recommendations:*

None.

##### *Assumptions:*

None.

##### *Alternative Solutions:*

The water service trench will need to be exposed and backfilled with structural fill and the asphalt from the alley to past the water service trench should be milled and overlaid to improve function and longevity. A sidewalk connection from the library to the park, with ADA ramps and crosswalk, would greatly improve pedestrian safety. The existing concrete pan and broken concrete gutters through the overlay zone will need to be removed and replaced, as will the sidewalk around the water meter. While this is being done, it would be advantageous to add an ADA ramp. **The estimated cost of this project is \$57,800.**

#### **Project R5: Goddard Ave (SH172) & Pioneer St. Parking Improvements**

##### *Existing Conditions:*

The north side of Pioneer Street is a mountable curb with an 8-ft wide informal gravel parking area. This area is heavily utilized by customers of the market and creates an obstacle for pedestrians traveling East-West along Pioneer. An existing sidewalk along the West side of Goddard ends as it turns onto Pioneer, where there is a fire hydrant. The sidewalk resumes on Pioneer, West of the alley. Formal (striped) parking exists on the South side of Pioneer.



*TMP Recommendations:*

The TMP recommends adding the missing sidewalk and providing 4 foot to 6 foot sidewalks along local streets.

*Assumptions:*

The Town wants to provide for pedestrian connectivity without negatively impacting parking for the market.

*Alternative Solutions:*

The Town will need to address the conflict between pedestrian travel and parking to promote safety in this area. As shown in **Exhibit R5**, the existing roll curb will need to be removed and replaced with 8-foot-wide parallel parking with 6-inch barrier curb. The parking lane should be concrete and graded towards a concrete pan at the edge of pavement that will maintain the flow line of Pioneer. A 5-foot attached sidewalk will run behind the curb and connect to the existing sidewalk on the West side of the alley. The alley will be repaved with a standard driveway apron to make the sidewalk ADA compliant and maintain the existing flow line. **The estimated cost of this project is \$58,400.**

**Project R6: Lampert St. & Goddard Ave. (SH172) Improvements**

*Existing Conditions:*

Lampert St, shown in **Exhibit R6** suffers from several issues related to lack of drainage infrastructure and failing pavement. There are not adequate storm drain inlets upstream of the intersection and a cross-pan does not exist on Goddard. This allows street runoff to flow down the street to the west, creating a failure point that has led to asphalt degradation and pothole formation. The frequent turning movements into the convenience store have also contributed to the failure of the asphalt in this area. Additionally, the intersection lacks ADA compliant ramps.

*IACAP Recommendations:*

The IACAP recommendation is to provide new sidewalks along Goddard.

*Assumptions:*

The Town has recently repaired the asphalt from Goddard to Browning with a mill and overlay on Lampert Street, however this will not solve the drainage issues or ADA issues.

*Alternative Solutions:*

While milling and overlaying will improve the asphalt function and longevity, the Town should consider adding concrete pan at the intersection and improving ADA ramps while adding crosswalk striping. **At an estimated total cost of \$31,000**, a relatively minimal investment above the mill and overlay would greatly improve drainage and pedestrian movement at the intersection.

## **Project R7: Becker Hill Improvements**

### *Existing Conditions:*

Becker Hill is a 30-foot-wide paved road with no curbs or sidewalks. It is also the primary route for busses, trucks, and other large vehicles to access the West Mesa area. There is guardrail along the eastern side protecting drivers from a steep hillside. An existing, non-ADA gravel footpath leads from the high school up the hillside, where it intersects Becker roughly two-thirds of the way up the hill. At this point, pedestrians are forced to walk in the roadway with no protection from traffic. An existing crosswalk at the top of the hill leads from Campbell park but dead ends at the guardrail, with no pedestrian facilities from this location to the break in the guardrail at the gravel footpath.

### *TMP Recommendations:*

The TMP classifies Becker Street as a “collector” with a suggested cross section of two 12-foot travel lanes with 5-foot bike lanes in each direction and 5 foot sidewalks on each side or a 10-ft sidewalk on one side. Becker is also identified as the primary access between the Town proper and the West Mesa. The TMP recognizes that no pedestrian facilities exist for this route and recommends these missing facilities be added, especially on routes to schools, which will encourage more school-age children to walk or bike to school.

### *Assumptions:*

The Town would like to limit widening the existing roadway to minimize the costs associated with retaining walls and replacing the existing guardrail system. As such, widening efforts should be focused on the West side of the road to maintain the existing guardrail. The existing non-ADA footpath is not a feasible path for an ADA route as regrading at an acceptable slope would be cost prohibitive.

### *Alternative Solutions:*

A possible solution is shown in **Exhibit R7**. In the interest of providing a safe bicycling and walking route, the Town should consider adding an 8-foot multiuse path on the west side of Becker, with curb and gutter. This would allow for the existing guardrail on the east side of the road to be maintained. Reducing the travel way to two 12 foot lanes would reduce the impact on the upslope side of the road. Curb inlets would need to be added approximately halfway down the hill and at the bottom to collect the channelized runoff from the new gutter. A small drainage ditch would be added to the western side of the sidewalk to collect flows coming down the hillside. To gain enough space for this small retaining walls may be needed. The 8-foot multiuse path would look to detach from the curb at the bottom of the hill where the grade allows to create a buffer between vehicles and pedestrians. The path would then narrow down at terminate at the existing sidewalk near the high school. **The cost of this project is approximately \$383,900.**

## **Project R8: Connect CR 320B for New Southern Access to SH 172/ Improve CR320B to South Town Limits for Future North-South Connection**

### *Existing Conditions:*

There is only one route (Becker Street) from the Town onto the West Mesa for school busses due to the poor condition of Burns Ave. This creates traffic and safety issues, as well as heavy congestion during



peak times. As part of future planning, a new access road from SH 172 South of the Town to the West Mesa is warranted. The Town has wanted this alternate route for years to the West Mesa to alleviate traffic and provide alternative access in the event of an emergency. The Town has recently purchased property at the current southern terminus of CR 320B which can be utilized for a portion of the required ROW for the new access.

CR 320B has been improved from north of the elementary school to south of the middle school, where it transitions back to the existing county road section. These improvements consist of two 12-foot travel lanes, bike lanes in both directions, curb and gutter, landscape buffer, and detached sidewalk on one side. South of this improved area, CR 320B is roughly 20 feet wide with no curb and borrow ditches for drainage. The road is surrounded by large rural properties, and the ROW is limited where it ties into existing improvements, which may conflict with widening. This would necessitate a new ROW plat to determine existing ROW and it is likely that ROW acquisitions would be necessary for improvements. Additionally, overhead power follows the existing road. This would need to be relocated or placed underground to avoid conflicts.

#### *IACAP/TMP Recommendations:*

The IACAP recommends that two new access points be constructed for the West Mesa to accommodate future growth. These access points are proposed to occur at Ute Road to the North and Cedar Street to the South. The IACAP also proposes closing El Paso Road to Browning Street once this alternate route is in place. However, the IACAP was prepared prior to the relocation of the elementary and middle schools onto the West Mesa and therefore did not take the traffic they generate into account. Furthermore, the Cedar Street connection up to CR 320B is not feasible due to the steep hill up to El Paso Road.

The TMP recommended construction of a north-south collector road to the West Mesa from near Rock Creek to Candelaria Drive to accommodate anticipated traffic growth by the year 2030. The TMP also recommends widening existing county roads on the West Mesa to improve capacity and safety, but offers no specific route. Additionally, the TMP recommends a road section similar to the one constructed between the elementary and middle schools.

#### *Assumptions:*

The Town would like to minimize impacts to property owners with the future road alignment. This future road alignment should also align with the existing access road to the SUIT wastewater treatment plant off SH 172, south of Rock Creek and meet CDOT requirements for intersection design.

Development of the West Mesa area and SUIT land to the south will continue to expand creating further need for the new West Mesa access.

#### *Alternative Solutions:*

**Exhibits R8.1 and R8.2** show a conceptual alignment for a new collector road from SH 172 south of Rock Creek to the existing terminus of the improved section of CR 320B on the West Mesa. The collector will require a bridge to cross Rock Creek approximately half way between SH 172 and the existing terminus of CR 320B. Both the road and the bridge should accommodate pedestrian and bike facilities, as well as two full width travel lanes. North of Rock Creek, the proposed road will cut into the existing hillside and maintain a maximum grade of 8% as it climbs to the mesa. The proposed alignment will cross multiple

SUIT properties and will require considerable support and consideration from the SUIT, the Ignacio School District, CDOT, and adjacent property owners. ROW or easements will need to be acquired from property owners and this cost is currently unknown. Additionally, CDOT will require additional intersection improvements based on a full traffic study. These improvements could include turning lanes or full signalization. A lump sum cost is included in the estimate as a placeholder.

**The total estimated cost of construction is \$4.3 million.**

**Exhibit R8.3** shows an alternate conceptual alignment for the new collector road that avoids crossing Rock Creek and the required bridge infrastructure. This alignment starts north of Rock Creek and parallels the creek as the road climbs to the West Mesa. The road will accommodate pedestrian and bike facilities, as well as two full width travel lanes. This alignment will require larger retaining walls and excavation to traverse the steep slope north of the creek. A proposed connection for the El Paso Road residences is shown as well, that would allow the existing El Paso road to be closed and the Town can avoid the reconstruction costs for this failing roadway segment.

The alignment can potentially avoid crossing SUIT properties, but will require substantial ROW or easements from the Whalen/Whittle property. Additionally, CDOT will require additional intersection improvements based on a full traffic study. These improvements could include turning lanes or full signalization. A lump sum cost is included in the estimate as a placeholder.

**The total estimated cost of construction is \$3.5 million.**

#### **Project R9: Goddard (SH172) Corridor ADA Compliance**

The majority of intersections along Goddard Ave (SH 172) through downtown Ignacio do not have ADA compliant curb ramps. An inventory of existing conditions is included in Table E, below.

**Table E: ADA compliance along Goddard Ave.**

<b>CURB RAMP ADA COMPLIANCE ON GODDARD AVE. SUMMARY</b>			
<b>Intersection (Goddard Ave. &amp; )</b>	<b>Curb Ramps</b>	<b>ADA Compliant</b>	<b>CURB RAMPS TO REPLACE</b>
Becker St.	4	NONE	4
Lakin St.	3-NW, NE, SW	NONE	4
Lampert St.	4	NONE	4
Pioneer St.	4	1, NE	3
Ute St.	4	4- EACH CORNER	0
Empire St.	4	NONE	4
Navajo St.	4	NONE	4
Pine St.	4	NONE	4
El Paso St.	2- NE, NW	NONE	2
<b>TOTAL</b>			<b>29</b>



Most of the existing curb ramps are not ADA compliant because they lack 1) a flat landing to traverse around the ramp on a level grade and 2) a detectable warning plate. In addition, the ramps may exceed maximum grades, but this needs to be verified by a survey. Several existing conditions constrain installation of compliant ADA ramp installation including power poles, street lights, and structures. Relocation of poles will be required to meet ADA standards in some locations.

The driveway cuts on Goddard each require the ramp within the sidewalk width, which is not compliant with ADA due to steep cross slopes. Additionally, in some areas, the curb height is in excess of 12-inches. Although this is not technically an ADA issue, it can cause issues with bicycle and vehicle traffic. In these areas, existing structures are built to the ROW, at the back of the sidewalk, with no setback and thresholds facing the sidewalk. This makes reconstruction costly and would require modification to the structures.

*IACAP/TMP Recommendations:*

Both the IACAP and the TMP recommend the installation of new, wider, ADA compliant sidewalks be installed in the downtown area. Bump outs (curb extensions) for pedestrian crossings at intersections are also recommended where practical. Part of the IACAP includes the Ute Street/Goddard signal and sidewalk improvements, which have already been constructed. The TMP also recommends that all driveway cuts and curb ramps be ADA compliant.

*Assumptions:*

All future construction projects regulated by the Town should mandate ADA compliant sidewalks and curb ramps.

*Alternative Solutions:*

The first step in developing a plan to address the ADA compliance of the Goddard corridor is to conduct a topographic and boundary survey to determine ADA compliance and the feasibility of modifying ramps. Then, to the extent possible, construct the ADA ramp improvements, which may require replacement of existing driveway ramps where conditions and ROW allow. In some cases, existing constraints may not allow full ADA compliance, and these variances will be documented. Please note that some of the improvements previously listed would replace curb ramps on Goddard, therefore some ADA ramps may already be upgraded prior to this project commencing. **The estimated cost of these improvements is \$333,200.**

Grants are available for ADA improvements through CDOT under the Federal Highway Administration TAP (Transportation Alternatives Program).

### **Project R10: Reconstruct El Paso Road from bottom to top of hill**

#### *Existing Conditions:*

El Paso Road is the only access to 9 single family homes at the top of the hill. The road is currently in poor condition due to poor slope stability. The condition of the road may have been worsened by excavation that occurred at the toe of the slope for the adjacent commercial property. The road lacks a sidewalk and adequate drainage features. The existing topography is a steep hillside and widening the road will likely require retaining walls.

#### *IACAP/TMP Recommendations:*

The IACAP recommends closing El Paso Road, assumingly to be replaced by the new West Mesa Access. Project R8 assumes this connection will occur on the new West Mesa Access. If the Town moves forward with Project R8, we recommend that El Paso Road be closed to traffic. If the West Mesa Access does not occur, the Town may want to consider reconstructing El Paso Road to ensure adequate access to the residential properties above.

#### *Assumptions:*

The reconstructed road will follow the same alignment and grade to minimize costs and impacts to the hillside. While reconstructing the road, a curb and gutter and attached sidewalk will be added to improve drainage and pedestrian access.

#### *Alternative Solutions:*

Project R10 will not be required if the West Mesa Access is constructed.

**The total estimated cost of construction is \$613,100.**



## Section 7 – Asphalt Management Plan

### Introduction

This Asphalt Management Plan (AMP) has been developed for the Town to provide guidance for maintenance, repair and improvement of the streets of Ignacio. Russell prepared a road assessment table (Table 7-A) that is included in the Appendix. This table identifies physical characteristics for Town roads and rates street conditions which was used as basis for the sample maintenance plans. Information in the inventory is based on field observations and Google Earth measurements. Prior to bidding road improvement projects, dimensions should be verified.

Roads were rated using three categories; Good, Fair and Poor. Good condition roads were considered roads with no immediate maintenance required (3-5 years). Fair condition roads included roads with superficial cracking and potholing, but not showing signs of subgrade damage. These roads need maintenance in the next 5 years with the primary maintenance being crack sealing to prevent moisture from degrading the subgrade and further deteriorating the road condition.

Poor condition roads are roads where substantial asphalt deterioration has occurred and require a mill and overlay project to extend the life of the road surface.

Road condition ratings are based on visual observations only. No geotechnical testing or other forms of pavement testing were conducted. Prior to road improvements, a geotechnical engineer should be consulted to determine the appropriate site specific rehabilitation method based on traffic loads and existing asphalt conditions.

Russell created sample maintenance plans based on a low budget scenario (\$75,000/year) and a high budget scenario (\$150,000/year). The actual budget will be determined based on Town funding. These sample plans demonstrate the ability of the annual budget to pay for road maintenance projects, but should be reconsidered with actual budgets when available.

### Pavement Maintenance Procedures

Pavement maintenance procedures are designed to slow the pavement aging process. Mainly, the procedures are designed to protect the pavement from the adverse effects of water and to some extent vehicle traffic.

Maintenance procedures which protect the pavement from aging are crack sealing, digouts, slurry seals, and chipseals. When pavements have extensive cracking, and are beyond their design life, sealing can also be used as an interim holding measure or stop gap prior to major rehabilitation.

#### **Crack Sealing**

Crack sealing prevents surface water from getting beneath the asphalt concrete layer into the aggregate bases. Crack sealing is generally performed using hot rubberized crack sealing material. The procedure includes routing small cracks, cleaning and sealing. The Town does not own its own crack sealing equipment.

### **Digouts (Patching)**

Digouts are small areas of deteriorated pavements (usually potholes) which are removed and replaced with new asphalt concrete. Pavement removal is accomplished by cold planning or saw cutting and excavation. New asphalt is installed in at least two lifts. The digout depth is determined depending on the severity and type of distress, as well as street type and construction. Shallow patching is often used on low to medium severity distressed areas of pavement where the underlying base is sound, while a full depth digout is required when the failure of the base material is detected.

## **Pavement Rehabilitation Procedures**

Pavement rehabilitation consists of procedures used to restore the existing pavement quality or to add additional structural support to the pavement. Rehabilitation procedures include heavy overlays; and reconstruction.

### **Heavy Overlay: Pulverization and Resurfacing**

Pulverization and resurfacing (also known as Cold in-Place Recycling) is an alternative to conventional overlays for streets that are structurally adequate but exhibit sufficient cracking to warrant improvement to the asphalt surface. Pulverization and resurfacing is an intermediate step between overlays and reconstruction. The existing asphalt concrete is pulverized, mixed with an engineered emulsion and reapplied over the existing aggregate base. The total structural section is increased by the recycled base. A final seal coat or thin overlay completes the resurfacing process. This method eliminates the stress history and cracking of the old asphalt concrete pavement, thus eliminating negative impacts on the new asphalt concrete surface.

Pulverization and resurfacing has a life expectancy of 13 to 18 years. The life expectancy is slightly less than full reconstruction because some residual deficiencies in thickness or quality of the unaffected layers may still exist. Additional testing is necessary to determine if pulverization is a viable alternative. This testing includes measuring the existing structural section and testing the native soil for bearing capacity (R-value). Pulverization is not typically used for urban areas where curb and gutter, driveways and sidewalks would be in conflict with the raised road section created by applying the new top coat of asphalt.

### **Heavy Overlay: AC Removal and Replacement (Mill and Fill)**

On some thick asphalt concrete pavements, the most economical approach to rehabilitating the pavement is to remove some of the existing asphalt concrete surface by cold planning and to place new asphalt concrete surface which matches the existing profile. This method may be required if the pavement profile is already so thick that the additional thickness obtained from recycling the existing pavement is unacceptable due to drainage, street geometry, or other concerns. The removed asphalt can often be recycled and reused on other streets if concurrent projects are planned appropriately. Depending on existing conditions, this method should have a life of 15 to 20 years.



### **Reconstruction**

When the pavement has severe cross section deficiencies or requires significant structural strengthening, reconstruction may be the only alternative. Generally, existing pavement materials are recycled and incorporated into the new pavement structure in a process called Full Depth Reclamation. This method minimizes the importation of new base material and virtually eliminates export of material to landfill sites. Engineered emulsion binders are mixed with the existing materials to form a base that is equal to or superior in strength to new aggregate base. The final surface is then applied, typically 4 to 5 inches of hot mix asphalt. Many of the residential streets on the north side of town require reconstruction due to the poor quality of the original construction prior to incorporation.

### **Pavement Maintenance Plan and Costs**

The Town has identified certain streets as a high priority do to their traffic volume and importance. Typically, these streets are collectors serving the main traffic generators in the Town, the schools and businesses. Local streets serving residential properties are generally a lower priority:

1. Give priority to more heavily traveled streets. The collectors serving the main traffic generators and school are given the highest priority and residential streets are given the lowest.
2. Preventative maintenance on streets which are considered "fair" is the best use of funds. Digout repairs followed by crack sealing measures can be used as appropriate. Priority is given to streets that are more heavily traveled. A portion of the maintenance budget each year should be spent on preventative maintenance.
3. Focus repair efforts in one area where possible to reduce costs.

Two types of projects were estimated for the AMP. Mill and Overlay projects are estimated based on a unit cost of \$3.50 per square foot (sf). Crack sealing is estimated at \$5 per linear foot (lf) of roadway. Prices are based on recent contractor estimates for similar work in La Plata County. For the purposes of this study, prices will not be adjusted for future inflation, however, the Town should plan to increase the yearly budget by 5% each year to keep pace with rising costs.

### **Pavement Maintenance Plan and Costs**

The following projects with estimated costs were identified to guide the development of an annual budget for asphalt management. Unit costs are available in the Appendix for review. The costs are averages. Small programs will have higher unit costs and large programs will have lower unit costs. The larger the annual program size, the better the economies of scale. Bidding the work in early spring will result in significantly lower prices than bids solicited in the late summer or fall. If small packages are used, costs could be 25 to 50 percent higher.

#### **Asphalt Management Projects**

<b>Project ID</b>	<b>Mill and Overlay</b>	<b>Limits of Project</b>	<b>Cost</b>
M-1	Ignacio Street	Browning Ave to Burns Ave	\$29,400
M-2	Becker St	Goddard to Browning Ave	\$47,880
M-3	Becker St	Browning Ave to Burns Ave	\$47,880



M-4	Becker St	Top of Becker Hill	\$47,250
M-5	Candelaria	Piedra to Maple	\$23,940
M-6	Lampert St	Browning to Alley (east)	\$32,732
M-7	Shoshone St	Alley to 150-ft beyond curve- both ends	\$58,800
M-8	Ute St	End to Browning	\$14,630
M-9	Ute St	Browning to Alley (east)	\$14,630
M-10	Empire St	End to Browning	\$16,660
M-11	Empire St	Browning to Goddard	\$33,600
M-12	Navajo St	Browning to Goddard	\$33,600
M-13	Navajo St	Goddard to Shoshone	\$37,100
M-14	El Paso Rd	Browning to Goddard	\$26,880

Project ID	Crack Sealing	Limits of Project	Cost
C-1	Pine St	Browning to Shoshone	\$3,300
C-2	Browning Ave	El Paso to Ute St	\$6,750
C-3	Browning Ave	Ute St to Becker St	\$7,600
C-4	Browning Ave	Becker St to Goddard	\$4,400
C-5	Pioneer St	End to Browning	\$810
C-6	Empire St	Goddard to Shoshone	\$1,700
C-7	Pioneer St	Goddard to Alley (library)	\$875
C-8	Lampert St	Goddard to Shoshone	\$1,550
C-9	Lakin St	End to Browning	\$800
C-10	Lakin St	Goddard to Shoshone	\$1,500
C-11	Romero Ave	Start to Tranquilo Ct	\$6,300
C-12	Arboles St	All	\$4,250
C-13	Piedra Ave	All	\$4,250
C-14	Maple Ave	All	\$4,250
C-15	Candelaria	Romero to Piedra	\$1,050

Since life cycle cost analysis is part of developing annual maintenance and rehabilitation programs, some general life expectancies should be identified. For a typical light maintenance treatment such as crack sealing, a service life of 5 to 8 years can be assumed. A typical conventional overlay has an expected service life of 8 to 13 years. Depending on the existing pavement and soil conditions, other rehabilitation options can be applied that will provide a service life of up to 18 years. A reconstructed pavement is expected to provide a service life of 20 years.

Depending on the existing conditions, the identified service life may vary. The projections of future life are given to provide a broad outline for pavement maintenance budgeting. They should not be interpreted as providing definitive predictions of future pavement performance.

Based on Town information, we prepared the following sample Asphalt Management Plans by year



for both a low yearly budget estimate of \$75,000 per year and a high yearly budget of \$150,000. The plan seeks to tackle the highest priority mill and overlay projects first, while maintaining yearly crack sealing of fair condition roads to prevent their deterioration. In the Low Budget plan, the recommended road projects are not completed until year 2024 assuming a start date in 2018. In the High Budget plan, the list of road projects is completed by year 2021. Once the high priority mill and overlay projects are completed, it is possible the Town could lower annual road maintenance costs and focus on more preventative maintenance in the future years.

#### **ASPHALT MANAGEMENT PLAN (LOW ANNUAL BUDGET- \$75,000/YR)**

##### **Road Maintenance Projects by Year (Low Budget)**

<b>Year</b>	<b>Projects</b>	<b>Project Street</b>	<b>Limits of Project</b>	<b>Cost</b>
<b>2018</b>	M-1	Ignacio Street	Browning Ave to Burns Ave	\$29,400
	M-6	Lampert St	Browning to Alley (east)	\$32,732
	C-2	Browning Ave	El Paso to Ute St	\$6,750
	C-3	Browning Ave	Ute St to Becker St	\$7,600
			<b>Total 2018</b>	<b>\$76,482</b>
			<b>Budget Remainder</b>	<b>-\$1,482</b>
<b>2019</b>			<b>\$73,518</b>	<b>budget</b>
	M-2	Becker St	Goddard to Browning Ave	\$47,880
	M-9	Ute St	Browning to Alley (east)	\$14,630
	C-1	Pine St	Browning to Shoshone	\$3,300
	C-4	Browning Ave	Becker St to Goddard	\$4,400
	C-5	Pioneer St	End to Browning	\$810
	C-6	Empire St	Goddard to Shoshone	\$1,700
	C-7	Pioneer St	Goddard to Alley (library)	\$875
			<b>Total 2019</b>	<b>\$73,595</b>
			<b>Budget Remainder</b>	<b>-\$77</b>
<b>2020</b>			<b>\$74,923</b>	<b>budget</b>
	M-3	Becker St	Browning Ave to Burns Ave	\$47,880
	M-5	Candelaria	Piedra to Maple	\$23,940
	C-8	Lampert St	Goddard to Shoshone	\$1,550
	C-9	Lakin St	End to Browning	\$800
	C-10	Lakin St	Goddard to Shoshone	\$1,500
			<b>Total 2020</b>	<b>\$75,670</b>
			<b>Budget Remainder</b>	<b>-\$747</b>
<b>2021</b>			<b>\$74,253</b>	<b>budget</b>
	M-4	Becker St	Top of Becker Hill	\$47,250



	M-8	Ute St	End to Browning	\$14,630
	C-11	Romero Ave	Start to Tranquilo Ct	\$6,300
	C-12	Arboles St	All	\$4,250
	C-13	Piedra Ave	All	\$4,250
			<b>Total 2021</b>	<b>\$76,680</b>
			<b>Budget Remainder</b>	<b>-\$2,427</b>
<b>2022</b>			<b>\$72,573</b>	<b>budget</b>
	M-7	Shoshone St	Alley to 150-ft beyond curve- both ends	\$58,800
	C-14	Maple Ave	All	\$4,250
	C-15	Candelaria	Romero to Piedra	\$1,050
			<b>Total 2022</b>	<b>\$64,100</b>
			<b>Budget Remainder</b>	<b>\$8,473</b>
<b>2023</b>			<b>\$83,473</b>	<b>budget</b>
	M-10	Empire St	End to Browning	\$16,660
	M-11	Empire St	Browning to Goddard	\$33,600
	M-14	El Paso Rd	Browning to Goddard	\$26,880
			<b>Total 2023</b>	<b>\$77,140</b>
			<b>Budget Remainder</b>	<b>\$6,333</b>
<b>2024</b>			<b>\$81,333</b>	<b>budget</b>
	M-12	Navajo St	Browning to Goddard	\$33,600
	M-13	Navajo St	Goddard to Shoshone	\$37,100
			<b>Total 2024</b>	<b>\$70,700</b>
			<b>Budget Remainder</b>	<b>\$10,633</b>

**ASPHALT MANAGEMENT PLAN (HIGH ANNUAL BUDGET- \$150,000/YR)**

Year	Projects	Project Street	Limits of Project	Cost
<b>2018</b>	M-1	Ignacio Street	Browning Ave to Burns Ave	\$29,400
	M-2	Becker St	Goddard to Browning Ave	\$47,880
	M-6	Browning to Alley (east)	Alley to 150-ft beyond curve- both ends	\$58,800
	C-2	Browning Ave	El Paso to Ute St	\$6,750
	C-4	Browning Ave	Becker St to Goddard	\$4,400
	C-5	Pioneer St	End to Browning	\$810
			<b>Total 2018</b>	<b>\$148,040</b>
			<b>Budget Remainder</b>	<b>\$1,960</b>
<b>2019</b>			<b>\$151,960</b>	<b>budget</b>



M-3	Becker St	Browning Ave to Burns Ave	\$47,880
M-4	Becker St	Top of Becker Hill	\$47,250
M-9	Ute St	Browning to Alley (east)	\$14,630
M-14	El Paso Rd	Browning to Goddard	\$26,880
C-1	Pine St	Browning to Shoshone	\$3,300
C-3	Browning Ave	El Paso to Ute St	\$6,750
C-6	Empire St	Goddard to Shoshone	\$1,700
C-7	Pioneer St	Goddard to Alley (library)	\$875
C-8	Lampert St	Goddard to Shoshone	\$1,550
<b>Total 2019</b>			<b>\$150,815</b>
<b>Budget Remainder</b>			<b>\$1,145</b>
<b>2020</b>			<b>\$151,145 budget</b>
M-5	Candelaria	Piedra to Maple	\$23,940
M-8	Ute St	End to Browning	\$14,630
M-10	Empire St	End to Browning	\$16,660
M-12	Navajo St	Browning to Goddard	\$33,600
M-13	Navajo St	Goddard to Shoshone	\$37,100
C-11	Romero Ave	Start to Tranquilo Ct	\$6,300
C-13	Piedra Ave	All	\$4,250
C-14	Maple Ave	All	\$4,250
C-15	Candelaria	Romero to Piedra	\$1,050
C-12	Arboles St	All	\$4,250
<b>Total 2020</b>			<b>\$146,030</b>
<b>Budget Remainder</b>			<b>\$5,115</b>
<b>2021</b>			<b>\$155,115 budget</b>
M-7	Shoshone St	Alley to 150-ft beyond curve- both ends	\$58,800
M-11	Empire St	Browning to Goddard	\$33,600
C-9	Lakin St	End to Browning	\$800
C-10	Lakin St	Goddard to Shoshone	\$1,500
<b>Total 2021</b>			<b>\$94,700</b>
<b>Budget Remainder</b>			<b>\$60,415</b>

### Recommendations

The Town of Ignacio has several critical asphalt management needs to be addressed in the next 5 years. Of primary importance is performing rehabilitation work on high priority roads servicing schools and businesses. It is also critical that the Town perform annual maintenance on fair and good condition roads to prevent further degradation, as this is the best use of Town budget. The "low" budget scenario project above does not address the Town's critical needs until the year 2024, therefore we recommend the higher amount be spent in the first five years to address these critical needs. At that point, a lower annual budget will likely meet maintenance needs in the future.

## Section 8 – Summary

The Town of Ignacio has multiple capital improvement needs to maintain its current infrastructure and prepare for future growth. This report has provided the following recommendations for Town infrastructure improvement projects;

- Water System Improvements
  - Becker Street PRV and Water Line Improvements
  - El Paso Road AC Water Line Replacement
  - Browning Ave Water Line Improvements
  - Aspaas Ave AC Water Line Replacement
  - CR320A Waterline Replacement
- Sewer System Improvements
  - Replacement of VCP pipe with PVC pipe
  - Reconstructing existing manhole inverts
  - Addition of manholes to dead ends
  - Sealing of manholes to prevent infiltration of groundwater
- Irrigation System
  - Addition of shutoff valves for improved maintenance
- Natural Gas System
  - Center alley, Pioneer St to Ute St, Steel Line Replacement
  - Replace service meters on existing services
- Transportation and Drainage
  - Goddard and Becker Street Pedestrian Safety Improvements
  - Browning Ave and El Paso St Improvements
  - HWY 172 and Browning Ave Pedestrian Improvements
  - Shoshone Ave Street Improvements
  - Goddard Ave and Pioneer Street Parking Improvements
  - Lampert St and Goddard Ave Improvements
  - Becker Hill Street Improvements
  - Improve CR320B and Connect to SH 172
  - Goddard Corridor ADA Compliance
  - Reconstruct El Paso Rd

The Capital Improvements listed above do not currently have budget allocated for their completion. These projects are to be pursued through a variety of funding mechanisms with a large portion of the funding to come from grants or CDOT. Private development adjacent to these areas should also bear some cost of improving Town infrastructure. Projects will be schedule and completed as funding allows with a priority given to projects that improve safety and reduce ongoing maintenance costs for Town infrastructure.

Additionally, sample Asphalt Management Plans were added for different budget amounts to demonstrate a strategic way to improve and maintain the Town's streets. The Town should allocate funds for maintenance separately from Capital projects to ensure existing asphalt is maintained properly to extend its useful life.



## Attachments and Appendices

(Water Model and Other Data, Maps, references)

ALL ATTACHMENTS AND APPENDICES ARE AVAILABLE FOR  
REVIEW AT TOWN HALL.

